

GREGG. (R. R.)

Constituents of Tubercles
and
Explanations regarding them.



Constituents of Tubercles,

AND

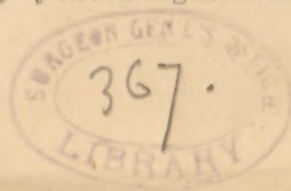
EXPLANATIONS REGARDING THEM.

BY ROLLIN R. GREGG, M. D., BUFFALO, N. Y.

The great diversity of opinion, and the numerous contradictions of each other by the best pathologists and microscopists, about the constituents of tubercles and their proper explanation, have so complicated the subject and confused all, that the following attempt is made to clear up and simplify these matters as much as possible.

Giant cells of tubercles. Capillary blood-vessels congested with fully decolorized, transparent, blood-corpuscles, and distended by them into protuberent sacs. They may also consist, in some cases, of similarly decolorized blood-corpuscles escaped through the broken walls of a capillary into the lymph spaces of a part and there embedded, or, perhaps, be enveloped more or less completely in an adventitious and very delicate membrane of fibrin, with threads of the latter extending off into the surrounding interspaces, to furnish the so-called "processes" of giant cells. Still, there can be little doubt that the collapsed walls of the capillary at each end of where the latter is distended into the protuberant sac, and also the collapsed walls of other capillaries anastomosing with the former at or near the sac, have been taken for said processes.

Transparent tubercular cells. Red blood-corpuscles decolorized to transparency by circulating in the too watery



serum of the consumptive, then congested in the capillaries to constitute tubercles.

Yellow tubercular cells. Red blood-corpuscles that have first been congested in the capillaries, before losing their color, then decolorized by the inflammation they excite and thus changed to a yellow color. The hæmatin is not so fully taken out of them by the inflammatory decolorizing process, as it is by their continuing on in the rounds of the circulation in a much too watery serum, consequently they are left more yellow. It should be further stated that the transparent cells after remaining incorporated in a tubercle a short time, begin to give up to the surrounding tissues, through endosmosis, the excess of water that has so fully decolorized them, and then they also become yellowish, but not so yellow as those decolorized by inflammation. It is these more fully decolorized blood-corpuscles that make the gray tubercular matter, or that having something of the color of old ashes, which is so commonly expectorated by consumptives in the advanced stages of their disease.

The perfectly transparent tubercles of Gross. These are constituted of perfectly transparent tubercular cells, "evidently deposited only a day or two before the individuals expired." ♥That is to say they are formed of blood-corpuscles entirely decolorized in the serum of the last stage of phthisis, when it becomes the most watery of at any time in the disease. These tubercles are then "of a soft, viscid consistence and perfectly transparent appearance."

a The gray or semi-transparent tubercles of Lænnec. These are generally such as form earlier in the disease than the foregoing, or before the serum becomes so excessively watery; and consist of similarly decolorized blood-corpuscles, but with the color not so completely taken out of them as in the above instance, thus leaving the tubercles partially opaque or translucent. Or the perfectly transparent tubercles of Gross become semi-transparent if

A SIMPLE SOLUTION OF THE MYSTERY OF TUBERCLE.

Chyle-Corpuscles, Red Blood-Corpuscles, and Tubercular Corpuscles, shown to be all one and the same under different conditions.

BY ROLLIN R. GREGG, M. D., BUFFALO, N. Y.



A group of chyle-granules, as first made in the lacteals, from the albumen and oily matters furnished to them as digestion progresses.



A compact group of chyle-granules ready to receive cell-wall.



A chyle-corpuscle after receiving cell-wall, but still showing its granular character.

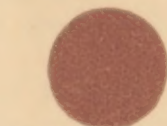


A chyle-corpuscle having lost its granular appearance, and assuming color, to become a red blood-corpuscle, as all chyle-corpuses do in health.

All blood-corpuses are made out of chyle-corpuses, and in the way here illustrated.



Disc face and edge of arterial blood-corpuscle.



Disc face and edge of venous blood-corpuses.



A red blood-corpuscle losing color, as they all do while dying, or after their death, whether of old age or disease.



These three figures show the blood-corpuses fully decolorized and brought back to their identical appearance as chyle-corpuses and chyle-granules, as they all are after their death of old age; and also illustrate their being broken down, in the exact inverse order of their being made, to be cast out from the blood vessels into and through the bowels as refuse matter.



Up to this point all the figures illustrate healthy action, or the making, and the normal disintegration of blood-corpuses at the end of their natural life, as daily carried on in all of us to keep us in health. The average duration of the life of the blood-corpuses is six weeks, when they die of old age, and must be broken down and cast out of the vessels to avoid their clogging the circulation, or becoming putrid, to irritate, or poison, every part.

The succeeding figures illustrate the same red blood-corpuses decolorized prematurely, by the too watery blood of the consumptive, or by chronic inflammation, or by both, thus destroying them too rapidly, that is, many of them in middle life, when, in such case, they become the so-called tubercular corpuses, which are then congested in mass, have fibrin poured out and organized around them, and are thus made into tubercles, which excite inflammation and destroy the lungs, or whatever other part they are deposited in.



A tubercular corpuse, showing its granules; or the red blood-corpuse decolorized by circulating in the too watery blood of the consumptive, or by chronic inflammation, either of which brings it back to what it was as a chyle-corpuse just after receiving cell-wall, and it is then called a tubercular corpuse.



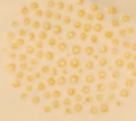
A distorted tubercular corpuse, its distortion owing to pressure in the tubercular mass. They take various forms under such pressure.

In the last stage of consumption, or sooner, if the blood becomes very watery, many of the blood-corpuses are entirely decolorized, leaving them transparent, and these constitute the *gray* tubercles of Laennec. Those decolorized by chronic inflammation make the *yellow* tubercle.



A tubercular corpuse that has had its cell-wall dissolved away, thus showing the same granular mass and identical granules that it had as a chyle-corpuse just before receiving cell-wall to become a chyle-corpuse.

Here, again, the blood-corpuses are shown breaking down in the inverse order of their being made, as all organic nature does when undergoing natural decay.



Tubercular granules, or a tubercular corpuse broken up into its granules, which are the same granules that the corpuse started with as a chyle-corpuse, to become a red blood-corpuse. Chyle-granules and tubercular granules are all identically the same, the first at the beginning of their healthy life, the last at its premature close by chronic or subacute disease.

Entered according to Act of Congress, in the year 1882, by ROLLIN R. GREGG, M. D., of Buffalo, N. Y.,
in the Office of the Librarian of Congress, at Washington, D. C.

Bacteria and Tubercles.

To the Editor of *The Courier*:

Will you allow me to prick one of the bacteria bubbles that is now sailing so gaily over the world? You know that Prof. Koch of Berlin asserts that tubercles are caused by bacilli and by ~~them~~ only. Very well; what are bacilli? They are one of the sub-divisions of bacteria, and Prof. Koch says they are vegetable parasites, or vegetable germs, and all scientists agree with him as to their vegetable nature.

What next are tubercles? Tubercles are wholly animal structures, and tubercle cells are purely animal cells. Well, Prof. Koch's claim then involves this flat contradiction of all nature, namely: that a purely vegetable germ, the bacillus, will produce a purely animal structure, the tubercle. And one of the strangest anomalies in all scientific controversy ~~that~~ has arisen over the discussion of the subject, to wit: that Prof. Tyndall, after fighting Bastian for years, upon the latter's "*de novo* origin of life," and on his doctrine of transmutation in the lowest forms of animal and vegetable life, now turns around against his own teachings of a lifetime, and says yes to Prof. Koch's claim, a vegetable germ will produce a purely animal structure.

How Bastian must dance for joy at this evidence of Tyndall's contradiction of himself, and endorsing his, (Bastian's) position. They might just as well tell us violets furnish the germs of alligators. Yours in the interests of a little common sense on this subject,

R. R. GREGG, M. D.

BUFFALO, May 12.

they have time, but not many days, to give up the great excess of water that has decolorized them, and shrink enough to destroy their transparency. In this last case, when time is given, and with gray tubercles generally, fibrin is poured out from its excess in the blood into and around the tubercle, to there organize and hold all in a firm mass.

Yellow tubercles. Such as are constituted of blood-corpuscles first congested in the capillaries, then decolorized to yellow by inflammation, as already said of yellow tubercular corpuscles.

The tubercle granule, or knot of Virchow, is the individual capillary filled with blood corpuscles decolorized to yellow by inflammation. It is the same thing, in fact, as the semi-transparent giant cell of other authors, the only difference being in the way the blood-corpuscles are decolorized. Every yellow tubercle of much size is made up of thousands upon thousands of these granules.

Besides the decolorized blood-corpuscles there are several other kinds of cells incorporated in a tubercular mass. For instance, there are :

1st. Proliferated and worn out, or dead, cells from the epithelial lining or inner walls, of the blood-vessels.

2d. Proliferated and dead endothelial cells, or cells of all the kinds that are cast loose at their death into the lymph spaces outside of the blood-vessels, and then carried along in said spaces to the tubercle, where their further progress is obstructed, and they become incorporated in it.

3d. Proliferated and worn out connective tissue cells, which are all embraced in the preceding, said cells being all expelled into the lymph spaces when dead.

4th. Proliferated and cast-off epithelial cells from the inner walls of the air cells and small bronchial tubes, in all cases where tubercles form in the lungs. There is often a great profusion of these in tubercles in the lungs.

5th. All tubercles that form in the glands contain, of course, great numbers of proliferated and worn-out gland cells. And those that form in the brain contain brain cells, etc., etc.

The word "proliferated" in the foregoing means, of course, that all the cells named are, in these cases, grown in excess of the requirements of the various parts in health. Being grown in excess of what is natural, they must be cast off in excess when they are worn out and die, hence there is a great excess of them to be incorporated in tubercles. And by my letter to Dr. Formad, in the March number of *THE ADVANCE* it will be seen how all these cell structures secure the nutriment to grow them in excess.

Fibrous stage of tubercle. This is the first stage of tubercle, when fibrin is extravasated from its excess in the blood and organized through and around it, holding its constituent elements in a firm resisting mass like concrete albumen, or often almost of a cartilaginous consistence. This is also the so-called *crude* stage of tubercles. As it ripens, however, or especially when inflammatory action is excited by it, to lead on to softening, or suppuration, then the organized fibrin permeating the mass is absorbed from, or broken up by suppuration in, the central portions of the tubercle, while that upon its surface, with more poured out and added to it, condenses to form the impervious wall of the resulting abscess to thus shut off its poisonous contents from percolating in every direction into the interstices of the healthy tissues. But for this provision the smallest tubercle in a lung would, upon suppuration, spread its poison in every direction, and speedily destroy that entire lung.

Inflammatory and suppurative stages of tubercles. These are, of course, what the terms signify, that is, first; the inflammation that congestion, or the presence of foreign matter in living tissues, is so liable to excite, and, secondly; the suppuration that inflammation whether acute or chronic, so commonly ends in.

Cheesy stage of tubercles. This is the ripened stage of many tubercles; and yet it is not the suppurative stage of such. It comes when the organized fibrin, and the natural tissues, as the walls of the capillaries, the nerves, connective tissue, muscular fiber, etc., held within the tubercular mass, are all, or nearly all, absorbed out of it, to bring the decolorized blood corpuscles and such other dead cells as may be mingled with them together in a friable or crumbling mass like old rich cheese. This is also called the caseation of tubercles. Many tubercles, however, go on rapidly to suppuration, and into a semi-fluid condition, without ever really presenting the cheesy stage.

Fatty degeneration of tubercles. This results from a deposit, in the first instance, of a portion of the excess of fatty matters left in the blood by a loss of albumen, in the tubercles, along with the decolorized blood corpuscles that principally constitute them; or, secondly, there is a deposit later, of some of this excess of fat, and an absorption, under pressure or otherwise, of more or less of the decolorized blood corpuscles; or, thirdly, there is an absorption of more or less of the other elements of the decolorized blood corpuscles, but leaving their fatty constituents as a fatty deposit. Some one of these, or all combined, cause the fatty degeneration of tubercles. Of course, it is not a supposable case that dead and decaying blood corpuscles, or other dead cells, in a dead mass like a tubercle, can set up organic action and generate oil, or fatty matters of any kind, out of the chemical ingredients of said dead cells. This cannot be possible, hence fatty degeneration must result in one or all the ways stated.

Cretification of tubercles. This, like the foregoing, is brought about in a somewhat similar manner. That is a portion of the salts always found in excess in the blood in such cases, is deposited at first, or later, along with the decolorized blood corpuscles in such quantity as to give the tubercle a fragile, brittle, or chalky appearance; or,

the organic matters are absorbed from the corpuscles, thereby leaving their mineral ingredients in the place the tubercle occupied.

It is a significant fact, too, in this connection, that laudable pus, the corpuscles of which are also blood corpuscles decolorized by acute or sub-acute inflammation, not unfrequently becomes cheesy, or undergoes fatty degeneration or cretification in the same manner, and for similar reasons that tubercular corpuscles pass through these changes. And shriveled pus corpuscles have many times been mistaken for tubercular corpuscles. In fact nobody can now tell the difference between shriveled pus corpuscles and tubercular corpuscles, unless they *go behind the mere appearances to the eye* and consider how the two originated.

The impervious wall of the tubercular abscess. This as already said, is constituted of the excess of fibrin in the blood in all such cases, extravasated freely upon and all around the tubercle, where it condenses and organizes into said impervious wall.

This is one of the greatest of all the great conservative principles of nature. But for it, as before said, the smallest tubercle in a lung or other organ, would on supuration, destroy that entire lung or organ, by allowing the liquid poison of the resulting pus to percolate in every direction through the interstices of the tissues, or the lymph spaces, to the most remote parts, carrying irritation, inflammation, mortification and death to the entire organ.

Even when a tubercle forms in the most remote part of an organ, as in the apex, or near the outer surface of a lung, and has to point towards, and find an outlet for, its pus at considerable distance, in a bronchial tube of sufficient size to carry it off; or, when one forms in either extremity of the liver, and points towards the gall bladder or gall duct to find its outlet; or, when tubercles develop in the loins to produce psoas abscess, and find an outlet for their pus away down on the thigh; in all these, and

every other instance, fibrin is extravasated from its excess in the blood, step by step, in advance of the progress of the abscess towards its final outlet, and there organizes into the impervious wall of the fistulous canal, to safely conduct all the pus and poison off, and not allow any of it to escape and burrow in the interstices of any of the surrounding healthy tissues. Not even so much as the millionth of an inch is anywhere left unguarded or uncovered, to allow the least particle of the liquid poison to spread or go elsewhere, than where it must, to find its exit from the system.

In all other abscesses, whether acute or chronic, internal or external, it is the same. It is even so with common boils. In boils, fibrin is poured out beneath and all around them up to the skin, and condenses into a dense wall, which holds the pus when it forms as in a saucer or cup. Then said wall firmly contracts upon itself, and towards the surface, and thus lifts or forces the matter out through the opening in the skin that suppuration finally brings. But for this impervious wall the smallest boil, or even a pustule on the back of the neck would take life in every instance. It would be much easier for the fluid parts of the pus, and even for the dead and putrifying blood corpuscles, (or, at least, the granules of the latter when the cell wall gives way to release them), to percolate or burrow and dissipate themselves into and through the lymph spaces in every direction, were said spaces not closed by the extravasated and organized fibrin, than to force themselves through the tough skin by the slow process of suppuration. Indeed there would seldom or never be an opening made through the skin by suppuration, if the contents of boils or abscesses could spread at will into the lymph spaces and thus be carried deeper into the system. And in that case death would be certain. For the same reasons the smallest pustule on the cornea would destroy the entire eye from the pus percolating through the interstices of the coats of the eyeball; thence it would

also be carried to the optic nerve and into the brain, and take life in every such case. The vaccine pustule would destroy an entire arm and probably life, but for this same wise provision.

The same fact holds also in Diphtheria. In every case of deep, or superficial ulceration, or abscesses, in this disease, fibrin is extravasated in the same manner and for the same purposes, to guard life in every possible way from the diffusion of accumulating or resulting poisons into deeper and more vital parts or organs. But all the great scientists of the world, now giving attention to these subjects, utterly ignore—let us hope they are not ignorant of—this greatest of all the preservative principles of nature, in guarding animal life; and here, as elsewhere, they call all the granules and fibrils that the extravasated fibrin *must* organize into, before they can coalesce to form the membranous wall of protection, bacteria. A sadly unscientific oversight by scientific men surely.

In conclusion, nothing in all nature, nothing in all science, nothing, indeed, in all theology, tells more unerringly of a God, or of a Supreme Intelligence behind, that planned all this, than does this great conservative principle of the extravasation and organization of fibrin in the ways and for the purposes stated. No “clashing of atoms with each other and their environment through countless ages,” or even for a few generations, in any form of animal life, ever developed that principle or guided to its perfect working. The *first* boil that ever formed was guided by it to as successful an issue and expulsion of its festering contents as any that form at the present time. And the first animal that was ever injured, to the extent of having suppuration result from it, was as thoroughly protected against the spreading of the pus back into its system to take its life, as any injured in their present generation. Therefore, *will* physicians and scientists heed this great principle, reason upon, and take advantage of it, as becomes intelligent men?

